Oil Shale

Oil shale development holds the promise of assuring the Nation's secure access to strategically important fuels to drive the economy, meet national defense needs, and fulfill global commitments.

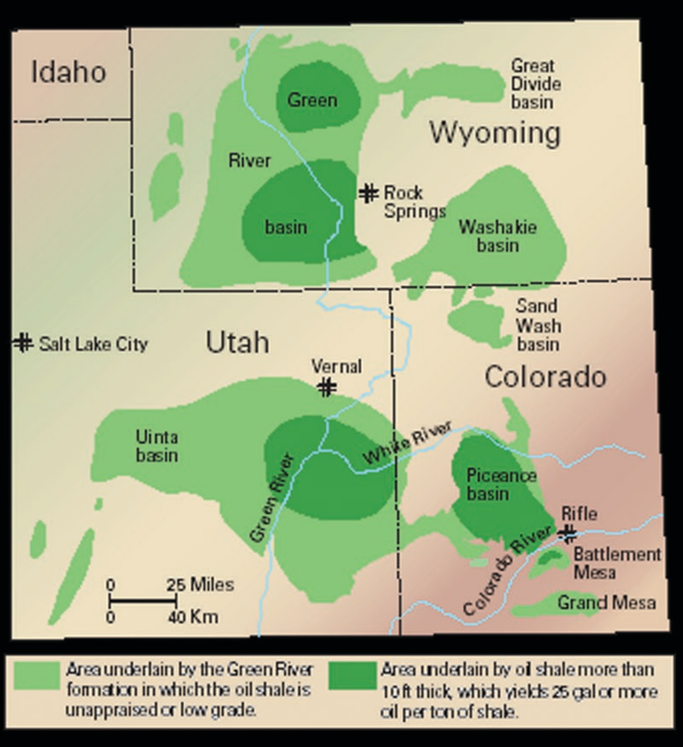
Strategic Significance of America's Oil Shale Resource, Vol. I, March 2004.

Western U.S. Oil Shale Deposits

The Green River Formation

U.S. oil shale deposits are among the richest and most geographically concentrated in the world. The potentially recoverable oil contained in the U.S. oil shale deposits exceeds one trillion barrels by most estimates.

The richest, most concentrated deposits of oil shale in the U.S. are found in the Green River Formation, underlying 25,000 acres in western Colorado (Piceance Creek Basin), southeastern Utah (Uinta Basin), and southern Wyoming (Green River and Washakie Basins).



More than a quarter million assays have been conducted on the Green River Formation oil shale. In the richest zone, known as the Mahogany Zone, oil yields vary from 10 to 50 gallons per ton and, for a few feet in the Mahogany Zone, up to about 65 gallons per ton.

The U.S. Department of Interior owns and manages about 73 percent of these western lands, which contain about 80 percent of the known recoverable shale oil. This Federally owned land could easily support a number of large projects with the ultimate production capacity of each lease of 100 to 300 MBbl/d.

Oil Shale Processing

The western U.S. oil shale is a sedimentary carbonate rock that is very rich in "young" organic material called *kerogen,* which has not yet been converted by pressure and temperature into crude oil. However, the kerogen can be converted into a synthetic crude-like oil and combustible gases through heating to temperatures between 400 and 500 degrees centigrade. This conversion can be achieved by mining the shale and then heating it in surface retorts, or by contacting and heating the oil in place (*in-situ*).

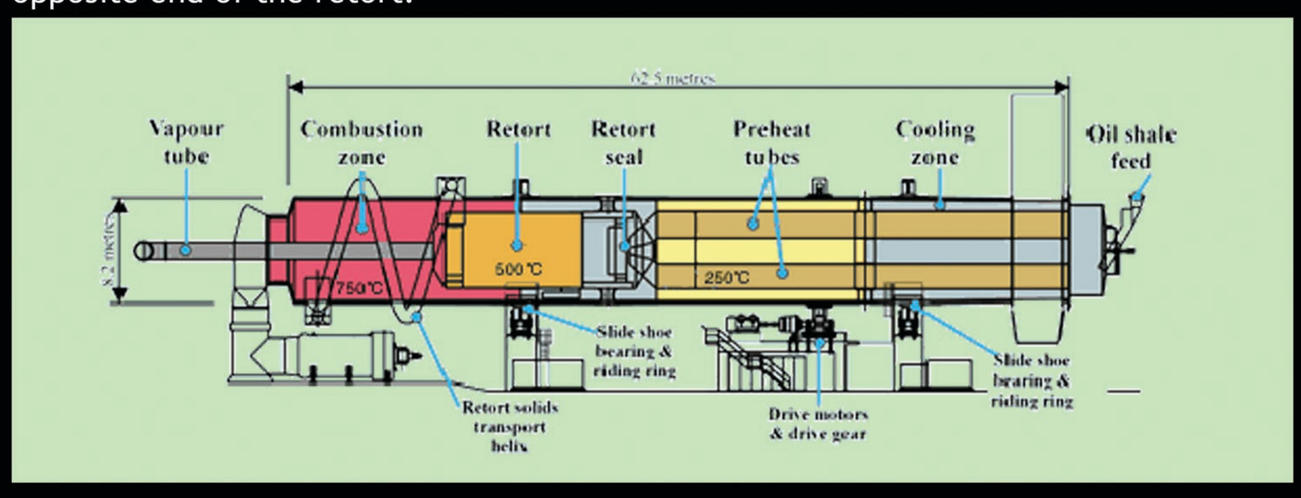
Surface Retorting

Surface retorting is used when the oil shale is shallow enough to be mined. Numerous approaches to surface retorting have been tested, and two major types offer significant promise, the vertical retort and the horizontal retort.

An example of a vertical retort is the gas combustion retort (CGR), in which crushed shale descends through the shaft by gravity, while hot re-cycled gases flow up from the bottom, heating the shale to required temperatures. The hot gases and oils from the heated shale leave the top of the retort as a mist.

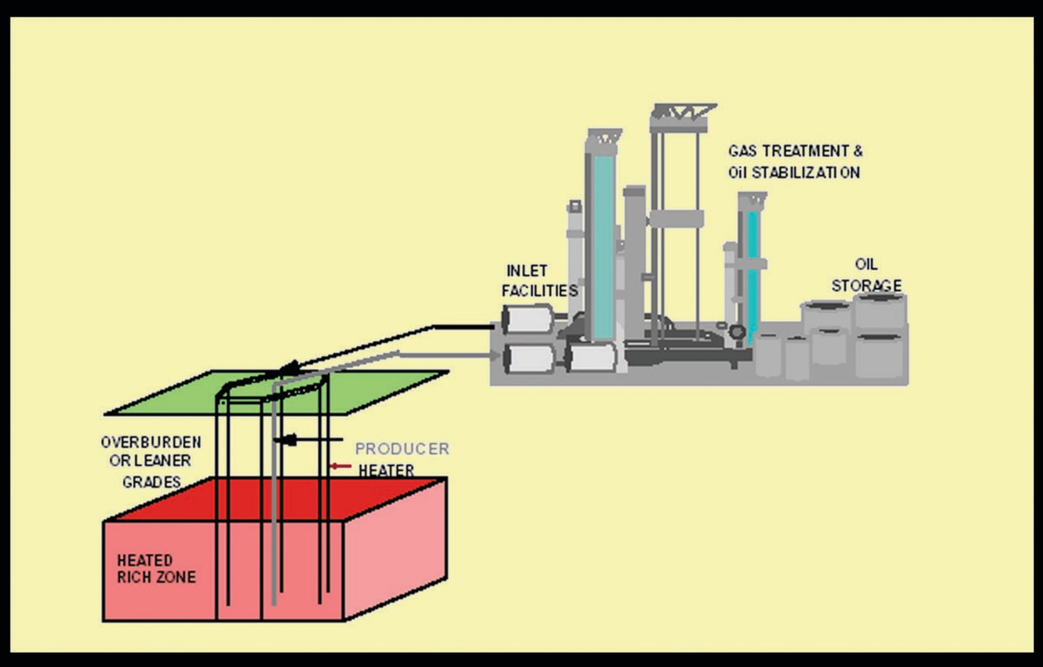
Horizontal Retort

In a horizontal retort, crushed shale is fed into one end and direct and indirect heat transfer from circulated hot solids in rotating kilns heat the shale to required temperatures. The resulting hot gases and oils from the heated shale leave the opposite end of the retort:



In-situ Processing

True in-situ processes involve no mining. In-situ processes are feasible for deeper, richer deposits where the rock has natural permeability or where permeability can be created by fracturing. In this process, the shale is fractured, air is injected, the shale is ignited to heat the formation, and the shale oil moves through fractures to production wells.



In a new in-situ conversion process (ICP), electric or gas heaters, placed in closely spaced vertical wells, heat the shale formation for two to four years.

The slow heating creates microfractures in the rock that augment natural permeability and enhance fluid flow from heated zones to vapor recovery wells and convential production wells.

Potential Benefits of Oil Shale Production

Public and National Benefits

Among the many potential benefits resulting from development of U.S. oil shale resources are:

- increased number of high paying direct new jobs in the oil shale industry and indirect jobs in commercial activity supporting the oil shale industry
- increased fuels availability with a high production assurance to meet domestic needs and international obligations
- reduction of crude oil prices
- increased Federal, State, and Local tax revenues
- development of technology for export

SI INTERNATIONAL

Contact:
Alan A. Burzlaff, P.E.
alan.burzlaff@si-intl.com
1-800-779-4367

All information and data presented herein, from:
http://www.fossil.energy.gov/programs/reserves/npr/NPR_Oil_Shale_Program.html